[Second Edition.]

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in Apparatus for Boring Wells and the like.

I, ALEXANDER IVANOVITCH MANCHO, a Russian citizen, of Soviet House, 49, Moorgate, London, E.C. 2, do hereby declare the nature of this invention (as communicated to me from abroad by Matvey Alexunovitch Capeliuschnicoff, a Russian citizen, of Baku, Caucasus, Russia), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for drilling bore holes, as in well-sinking, of the kind described and claimed in Patent Specification No. 225,931, in which water is supplied under pressure through a pipe or a series of connected pipes, which do not rotate, to a hollow drill head or chamber in which is mounted a hydraulic rotor or turbine driven by the said water supply and which, through gearing, drives a tubular stem carrying the cutting tool or bit, the water discharged from the turbine being by-passed directly from the rotor to the drilling bit without traversing the gear.

The present invention consists of a modification of or improvement in this kind of apparatus.

The principal feature of the present invention resides in the construction and arrangement of the casing which encloses the rotor spindle and transmission gear and around which the water or slush is by-passed from the rotor to the drilling bit, this casing being made detachable from the outer stationary piping and provided with means for definitely locating and securing it therein. Further, improved means are provided for preventing the access of slush from the outer piping to the interior of this casing and various other improvements are provided which will be hereinafter specifically described.

The invention is illustrated in longitudinal and transverse section respectively in Figs. 1 and 2 of the accompanying drawings. The water or slush is pumped or otherwise forced down the stationary piping C which at its lower end is screwed into a hollow drill head D within which the rotary drill is mounted. In the upper end of this hollow drill head is a hydraulic rotor or turbine F which is driven by the water or slush forced into the bore hole. The rotor spindle F^1 is journalled at its upper end in ball bearings B fitted in a sleeve E which is screwed into an upward tubular extension of the stationary guide ring or nozzle F^2 of the rotor. Anti-friction thrust bearings B^1 are fitted between an internally projecting shoulder F^3 of the stator ring F^2 and the lower end of the sleeve E. A cap A screws into the upper end of the stationary guide ring to enclose the end of the rotor spindle and provide a reservoir for lubricant to which access is obtained through an aperture A^1 normally closed by a screwed plug, or fitted with an oil or grease cup.

The rotor F has a depending tubular sleeve or skirt F^0 so shaped as to form a labyrinth with the walls of a stationary cap M which is connected, as by screwing, with the upper end of an internal tubular casing L provided to enclose the rotor spindle and transmission gear. This cap M is provided with a bush or bearing M^1 for the rotor shaft, and this bearing is furnished with lubricant from the reservoir within the cap A through an axial bore F^4 in the upper part of the rotor shaft and a radial bore F^5 leading therefrom to the bearing surface.

The tubular casing L is made separate and readily detachable from the stationary drill head D, being provided with longitudinal ribs L^0 adapted to slide in longitudinal channels D^0 in the interior of the drill head D which is pro-

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vided also on its interior with stops D^1 which determine the longitudinal position of the casing L in the drill head.

The drill socket member G is driven from the rotor shaft F^1 through an epicyclic chain of gears H, I^1, I^2, I^3, J, of which the planet wheels I^1, I^2, I^3 are carried on stub shafts which are screwed into a collar G^1 at the upper end of a shaft G^0 of which the socket member G forms a rigid extension.

Upon rotation of the rotor F the planetary transmission gear will rotate the spindle G^0, and consequently the drill, at a speed determined by the gear ratio and this speed can readily be varied, according to the character of the work to be done, by an interchange of the reduction gears.

Thrust bearings K, K are provided between an inwardly projecting shoulder L^1 on the casing L and the collar G^1 and the upper end G^2 of the drill socket, which latter part is provided with a bearing sleeve or bush G^3 rotating within the lower end of the tubular casing L. Suitable clearances are provided in the various parts whereby the thrust bearings K and bush G^3 are lubricated by oil escaping from the reduction gears.

The casing L terminates in a ring L^2 which fits within a shoulder N^1 on a cap or sleeve N which screws on to the lower end of the drill head D, and this sleeve has a ferrule or bush O of suitable material within which the drill socket G revolves. Setscrews P screwing into the sleeve N through holes in the bush O project into peripheral grooves on the exterior of the drill socket, without touching the latter, so as to prevent the socket from falling out should it be detached from the spindle G^0.

The water or slush delivered through the piping C, after passing through the ring of stationary nozzles F^2 and the vanes of the rotor F, is by-passed directly to the tubular drill socket through the longitudinal channels L^3 between the fixed casing L and the wall of the drill head, and thence through apertures L^4 in the lower end of the tubular casing L and G^4 in the tubular socket G.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An apparatus for drilling bore holes of the kind herein specified, wherein the casing enclosing the power transmission gear between the rotor and the drilling spindle is detachable from the hollow drill head and is provided with means for definitely determining its position therein when assembled.

2. An apparatus according to Claim 1, wherein the enclosing casing is provided with longitudinal ribs engaging grooves in the drill head and the latter is provided with abutment stops, substantially as described.

3. An apparatus according to the preceding claims, wherein the upper end of the enclosing casing is provided with a cap which is formed to constitute a labyrinth in conjunction with a sleeve or skirt depending from the rotor or turbine wheel, substantially as described.

4. An apparatus according to the preceding claims, wherein thrust bearings to take the end thrust on the rotor spindle are interposed between the upper part of the said spindle and the fixed nozzle ring or stator of the turbine, substantially as described.

5. An apparatus according to Claim 4, wherein an upward tubular extension of the fixed nozzle ring or stator is provided with a cap which encloses the upper part of the rotor spindle and constitutes a lubricant reservoir, substantially as described.

6. An apparatus according to Claim 5, wherein the said reservoir is connected by ducts in the rotor spindle with an intermediate bearing surface of an intermediate bearing of the rotor spindle, substantially as described.

7. An apparatus for drilling bore holes constructed substantially as herein described and illustrated.

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2nd Edition

FIG. 1.

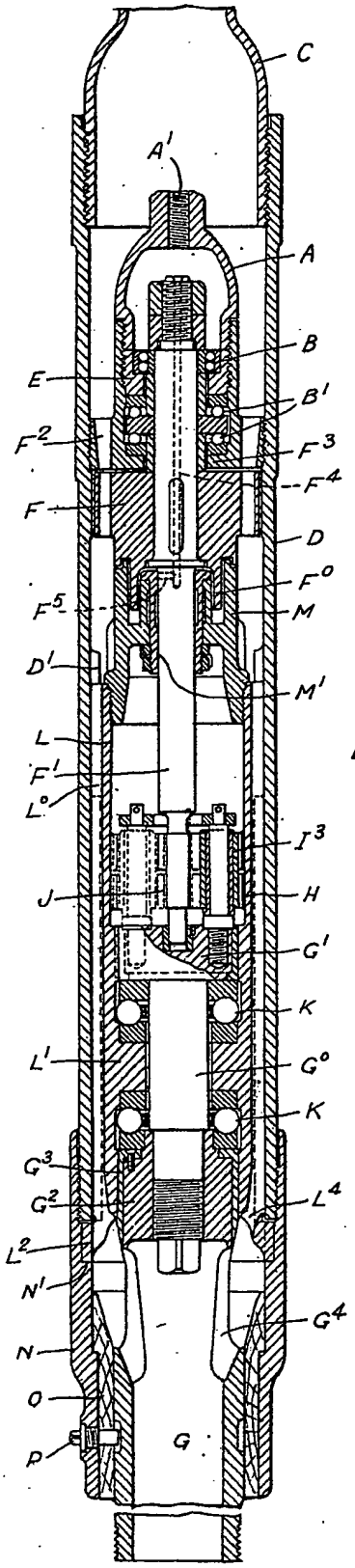
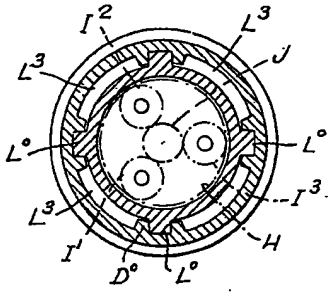


FIG. 2.



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